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Treatment of Acute Pancreatitis in The Emergency Room

What Should be Done During the First Hours of Disease?

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Introduction

Acute pancreatitis (AP) is among the most common gastrointestinal causes of hospital admission in the United States, with nearly 250 000 hospitalizations annually at a cost of US$2.6 billion [1]. The incidence of AP is increasing and despite advancement in medical therapies the overall mortality continues to be under 2% [1–3]. Currently, there are no pharmacological therapies existing to treat acute pancreatitis. This chapter focuses on early management of AP in the emergency room within the first few hours of presentation. This includes prompt accurate diagnosis, evaluation for possible etiology, and role of prophylactic antibiotics, urgent endoscopic retrograde cholangiopancreatography (ERCP), nutrition and fluid resuscitation, all very critical for patient outcomes.

Early Diagnosis in the Emergency Room

Acute abdominal pain is one of the common complaints among patients presenting to the emergency room. Making an accurate diagnosis and starting appropriate treatment could be challenging. The diagnosis of AP is established by the presence of at least two of the following features: (i) typical abdominal pain; (ii) elevated amylase or lipase greater than three times the upper limit of normal; and/or (iii) characteristic findings on cross-sectional imaging [4]. In general, patients with AP present with typical mid-epigastric and/or upper abdominal pain, which sometimes radiates to the back. The intensity of abdominal pain does not correlate with the severity of the disease [5]. However, the presence of two or more systemic inflammatory response syndrome (SIRS) criteria within the first 24 hours may be associated with severe AP [6]. Physical examination findings often include tenderness in the upper abdomen. Late-stage findings, such as skin discoloration around the umbilicus (Cullen sign) and flank (Grey Turner sign) from retroperitoneal hemorrhage, are uncommon and seen in less than 1% of patients [7]. When considering the diagnosis of AP, emergency room clinicians should order basic laboratory tests including complete blood count, lipase, amylase, liver function tests, blood urea nitrogen, creatinine, lactate dehydrogenase (LDH), and triglycerides.

The diagnosis of AP may be often overlooked [8]. While most patients present with abdominal pain, a small proportion of patients may present without any pain [9,10]. Very sick patients presenting to the emergency room may be sedated, intubated, or unconscious from medical conditions and it is often not possible to elicit history regarding abdominal pain or perform a good abdominal examination. In rare patients the pain may be only in the right upper quadrant or even in the lower abdomen. Unless routine blood work reveals elevated levels of amylase and/or lipase, a true pancreatitis might go undiagnosed for many days, while the patient is being treated for other causes of SIRS [11]. Serum amylase level has several limitations: it can be elevated in nonpancreatic diseases, and it returns to normal rapidly. Therefore, serum lipase, either alone or in combination with amylase, is preferred for diagnosis of AP [12]. However, physicians should remember that both amylase and lipase could be elevated in some critically ill patients without pancreatitis [11]. On initial presentation, contrast-enhanced computed tomography (CT) and/or magnetic resonance imaging (MRI) of the pancreas should be performed only in patients where the diagnosis is uncertain from clinical and laboratory evaluation alone or in those where initial evaluation suggests a severe AP, in order to look for local complications like necrosis [13].

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Initial Work-up for Etiology

When considering the diagnosis of AP, emergency room clinicians should order basic laboratory which including complete blood count, lipase, amylase, liver function tests, blood urea nitrogen, creatinine, LDH, and triglycerides.

Gallstones and alcohol are the two most common causes of AP. Gallstones are estimated as culprit in 40–70% of cases [14]. Therefore, a transabdominal ultrasound should be obtained in all patients presenting with AP to the emergency room [15]. However, if the patient has normal liver function tests at the time of diagnosis of AP and has gallstones, the gallstones may not be the cause of AP as evidenced by recurrence of AP in approximately 34% of cases after cholecystectomy [16]. Alcohol intake is the second most common cause, noted in 25–40% of patients [14,17]. For alcohol to cause AP, it is considered that the patient should have a history of chronic alcohol abuse, consuming more than 50 g of alcohol per day for more than five years. Binge drinking in such patients can cause AP after an interval from cessation of drinking [18,19]. However, it should be noted that only a small proportion of such heavy drinkers (<5%) will develop pancreatitis. The presence of an abnormality in the gene for claudin-2 (*CLDN2*) may explain those who might suffer pancreatic disease [20]. A thorough alcohol history should be obtained in all patients presenting with AP.

In absence of gallstones or significant alcohol intake, other less common causes should be considered. Hypertriglyceridemia (triglyceride levels >1000 mg/dl) can cause AP [21]. Patients who have undergone recent ERCP could develop acute post-ERCP pancreatitis as an adverse event from the procedure [22,23]. Many medications have been hypothesized to cause pancreatitis. Some of the well-known culprits are 6-mercaptopurine or azathioprine, L-asparaginase, isoniazid, loop diuretics, and didanosine [24]. Rarely, pancreatic neoplasm or cysts (intraductal papillary mucinous neoplasm) can present as AP. If no obvious etiology is found after initial work-up with blood tests and transabdominal ultrasound, further work should be done by seeking expert consultation.

Severity Assessment, Triage, and Disposition

There is very little data that can be used to assess which patients with AP can safely be discharged from the emergency room. Whitlock et al. [25] looked at scoring systems to predict readmission within 30 days and identified the following discharge characteristics as risk factors: inability to tolerate a solid diet, any gastrointestinal symptoms (nausea, vomiting, diarrhea), pain, pancreatic necrosis, and treatment with antibiotics. Although this is primarily for inpatient hospitalization, one could argue this could also be used in the emergency room.

It is crucial to promptly identify patients who need intensive care unit versus medical floor hospitalization and those who need subspecialist consultation. Although there are numerous scoring systems for assessing the severity of AP, most of these systems have been criticized as they require more than 48–72 hours before score parameters become evident and are therefore not very useful in the emergency room setting [26,27]. The most practical and useful evaluation includes assessment of SIRS criteria [6]. It is critical in the early phase of management to (i) determine patient-related factors such as age and body mass index; (ii) perform a careful clinical examination; and (iii) utilize the available laboratory results to assess early fluid losses (e.g. rising blood urea nitrogen, creatinine, hematocrit), hypovolemic shock, and signs of organ dysfunction (Table 7.1).

Specialty Consultation

Prompt specialist consultation should be sought for patients with AP. A routine gastroenterologist or pancreatologist consultation should be obtained for all patients presenting with

Table 7.1 Clinical findings associated with a severe course for initial risk assessment.[a]

Patient characteristics
Age >55 years
Obesity (BMI >30 kg/m^2)
Altered mental status
Comorbid disease
Systemic inflammatory response syndrome (SIRS)
Presence of more than two of the following criteria:
Pulse >90 bpm
Respirations >20/min or $PaCO_2$ >32 mmHg
Temperature >38°C or <36°C
WBC count >12 × 10^9/l or <4 × 10^9/l or >10% immature neutrophils (bands)
Laboratory findings
Blood urea nitrogen (BUN) >20 mg/dl
Rising BUN
Hematocrit (HCT) >44%
Rising HCT
Elevated creatinine
Radiology findings
Pleural effusions
Pulmonary infiltrates
Multiple or extensive extrapancreatic collections

[a] The presence of organ failure and/or pancreatic necrosis defines severe acute pancreatitis.
BMI, body mass index; WBC, white blood cell. *Source:* Tenner et al. [5]. Reproduced with permission of Wolters Kluwer Health, Inc.

AP. When gallstone etiology is suspected, a surgical consultation for possible early cholecystectomy during the same admission is recommended by American Gastroenterological Association (AGA) guidelines [28,29]. Some of the patients with gallstone pancreatitis may have concomitant acute cholangitis and/or choledocholithiasis from gallstones obstructing the common bile duct. Cholangitis, as in those patients without AP, is an indication for urgent ERCP [29]. If liver dysfunction and/or dilated bile ducts are noted on the ultrasound, consultation with an interventional endoscopist for possible ERCP is recommended.

Management

First-line Medical Management: Fluid Resuscitation

Time is of the essence in managing AP. There is no pharmacological therapy for AP. Fluid resuscitation is the mainstay of therapy in AP, where patients often present in a volume-depleted state due to vomiting, poor oral intake, and insensible losses. An acute surge in release of inflammatory mediators results in increased vascular permeability and third spacing of fluids [30]. Early administration of adequate fluid therapy to prevent hypovolemia and organ hypoperfusion is critical in the management of AP. Despite multiple guidelines and publications, a recent exhaustive technical review by the AGA observed that there is no clear evidence to recommend the volume, type, duration, or rate of fluid administration [28]. Current clinical guidelines recommend goal-directed fluid therapy which focuses on administering intravenous fluids and monitoring heart rate, mean arterial pressure, central venous pressure, urine output, blood urea nitrogen concentration, and hematocrit [29]. Inadequate fluid resuscitation in the first 24 hours, as evidenced by hemoconcentration, has been associated with increased rate of pancreatic necrosis [31,32]. Aggressive intravenous fluid resuscitation during the initial few hours provides microcirculatory and macrocirculatory support to prevent development of pancreatic necrosis [33]. Although the evidence supporting goal-directed aggressive fluid therapy in AP is relatively limited in demonstrating improvement in important outcomes such as mortality and organ failure, using such metrics has been shown to improve outcomes in sepsis, which has a similar picture to AP [34,35]. Also, using such goal-directed fluid hydration avoids overly aggressive fluid therapy, which can lead to complications such as volume overload and abdominal compartment syndrome [36,37]. Recent data suggests moderate to aggressive fluid administration is most beneficial if administered in the first 24 hours [38] and has little impact after this point [37,39,40]. The optimal recommended infusion rate in the first 24 hours is 250–500 ml/hour, unless there are cardiovascular, renal, or other medial comorbid conditions [5].

Type of Intravenous Fluid to Administer

Recent randomized controlled trials have compared normal saline and lactated Ringer's as an optimal fluid for resuscitation in AP [41,42]. These trials used surrogate markers of severity as end points and did not necessarily use more salient clinical outcomes such as mortality and organ failure. However, lactated Ringer's solution appears to be more beneficial, resulting in fewer patients developing SIRS when compared with normal saline [42,43]. Although the data is still limited, current clinical guidelines (ACG, IAP/APA) recommend using Ringer's lactate as the preferred intravenous fluid over normal saline [5,29,44]. The AGA technical review analyzed two studies using hydroxyethyl starch (HES) in AP and noted that multiorgan failure was significantly increased with administration of HES [28]. AGA clinical guidelines do not recommend using HES in AP [29].

Antibiotics

Routine administration of antibiotics in patients with AP is not currently recommended. In the past, prophylactic antibiotics were administered to decrease risk of infection in pancreatic necrosis. A few unblinded studies showed that imipenem was beneficial in preventing infection in pancreatic necrosis [45]. However, better-conducted studies have shown that prophylactic antibiotics do not reduce risk of infection in necrotizing pancreatitis [46,47]. The AGA technical review observed that recent clinical trials showed no difference in risks of infected pancreatic and peripancreatic necrosis or mortality with prophylactic antibiotic usage [28]. Patients presenting with concomitant cholangitis or other coexisting infection should receive antibiotics in the emergency room. In all other patients, both mild and severe pancreatitis, routine antibiotic prophylaxis is not recommended [29].

In many instances, severe AP is indistinguishable from sepsis or concomitant cholangitis. In such scenarios when infection is suspected, antibiotics should be promptly administered after drawing blood sample for cultures. Once blood cultures are found to be negative, and no other source of infection is identified, antibiotics should be discontinued [5,29].

Pain Control

AP can result in severe abdominal pain, which should be treated in the emergency room. Abdominal pain is often

reproduced early in the course with oral intake and patients should be kept nil by mouth for the initial few hours when the pain is severe [48]. Mild abdominal pain can be treated with intravenous acetaminophen or tramadol, although most patients require opioid analgesics for better pain control.

Nutrition

Bowel rest is no longer the standard of care in AP. In the past, it was believed that allowing patients to take anything by mouth had a theoretical risk of stimulating the pancreas and thereby worsening pancreatitis. However, several studies have now shown that patients initiated on oral feeding early in the course of AP have shorter hospital stay, reduced infectious complications, and decreased mortality [28, 49–52]. The current recommendation to initiate early oral feeding relies on the fact that enteral nutrition likely serves to protect the mucosal barrier of the gut and diminish bacterial translocation, thereby reducing the risk of developing infections in the pancreatic necrosis [29]. When compared to parenteral nutrition, early enteral nutrition is associated with decreased rates of overall infection and lower risk of complications [28,49,53,54]. Patients who cannot tolerate immediate oral feeding may require nasogastric tube placement for nutritional support. There is no advantage in placing a nasojejunal tube (post-pyloric) compared with gastric tube placement [54,55].

Summary

Clinicians in the emergency room play a crucial role in the management of AP. Prompt accurate diagnosis is usually made by physical examination, laboratory assessment (including lipase and liver function tests), and right upper quadrant ultrasound scan. Certain special scenarios may warrant CT or MRI in the emergency room. A quick risk stratification facilitates appropriate triage and suitable consultations. Initiating judicious early aggressive fluid resuscitation is the cornerstone of management of AP. After providing adequate pain control, early oral feeding should be encouraged. Pancreatitis, a potentially fatal disease, can be managed effectively in the first few hours of presentation and this can change the natural course of disease towards a better outcome.

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